I never made one of my discoveries through the process of rational thinking.

— Albert Einstein

CHAPTER – III

METHODOLOGY
AND DESIGN
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METHODOLOGY AND DESIGN

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CHAPTER – III
METHODOLOGY AND DESIGN

This chapter had been divided into three parts, the first part was devoted to the methodology, the second part described the tools used in the study and the third part dealt with the general procedure.

PART – I

3.1 Nature of the Study

The main approach of this study was survey. But this survey was done through several tests and questionnaires in a particular field area to collect the valuable data. Hence, it was field survey. This study aimed at finding out the abilities of the target groups and to determine relationships between dependent variable (Creativity) and independent variables (Freedom of the Students, Family Structure, Family Tension, Socio-economic Status, Gender). For this purpose, scores were calculated on the basis of performances or responses of the sample students in the given tests and questionnaires. So, it was obviously a quantitative research which described some relationships among the concerned variables. Hence, this study was a field survey descriptive research quantitative in nature.

3.2 Methodology

The main purpose of the study was to determine the relationship between criterion (Creativity) and predictor variables (Freedom, Socio-economic Status, Family Tension, Family Structure). For this purpose, the descriptive survey method of educational research had been followed. In this study the researcher performed the investigation on pupils of secondary level (grade VIII and IX). Collected data were arranged according to their code numbers. The magnitude of the relationship was determined by the researcher personally through the use of the coefficient of correlation with the help of computer software SPSS version 12.0. Besides this, graphical representation helped to describe the relationship clearly.
Inferential Statistics – analysis of variance (ANOVA), t-test had been applied to compare the ability between Boys and Girls, or between the groups – High and Low of each independent variable (Autonomic and Syncretic co-operative for Family Structure). The inferential statistics helps the researcher to test the hypotheses and to get some important inferences.

Multiple regression is one of the most frequently used technique of analysing data in behavioural research. It is a method of analysing the collective and separate contributions of two or more independent variables (Predictor variable) to the variation of a dependent variable (the criterion). In this case, the co-variation between a set of independent variables with the dependent variable was being considered.

The important aim of multiple regression analysis is prediction. In this research, one of the major objectives was to know to what extent creativity could be predicted on the basis of Freedom, Socio-economic status and Family Tension.

3.3 Population

All the students of grade VIII and IX of Bengali medium schools under West Bengal Board of Secondary Education, of two districts Nadia and North 24 Parganas were the population of this study. So, the students studying in class VIII and IX at English or Hindi medium schools under West Bengal Board of Secondary Education or any other Board of Education were not considered in this population. Also, the schools run by the private bodies were not included in the target population. Different versatile characteristics were found in the families of these two districts due to Geographical position, Cultivation, Industrial growth, Handicrafts, Education, Medical facilities, Political effects and nearer to the metropolitan city-Kolkata.

As the diversified families lived in these two districts, so variety types of students, with respect to their family environment, might be found in the population.

3.4 Sample

The sample consisted of 372 school going students of class VIII and class IX from eight different types of schools of district Nadia and North 24 Parganas. All the selected schools were of Bengali Medium under West Bengal Board of Secondary
Education. There were 179 boys and 193 girls in the sample. Different types of schools were selected randomly from the both districts- according to a particular ratio.

The intellectual development and functioning takes a very sophisticated shape at Formal Operation Stage (Piaget, 1952) as the child learns to deal with abstraction by logical thinking. Here the child, age of 11 and above, learns to utilize the tool of symbolism as effectively as possible in the process of thought and problem solving. He begins to construct relationships between concrete operations and between symbols. He also begins to look at problems in many ways and explore various solutions but in a very systematic and logical way. Keeping this aspect in mind, the investigator selected the students of class VIII and class IX as the sample for this study.

3.5 Sampling Frame and Sampling Techniques

Total 372 students of class VIII and class IX were taken as the sample for this study. They were selected from different types of schools of different places of the two districts. Sampling frame of this study was as follows:

Table – 3.1
Showing the Number of Selected Schools for Sample

<table>
<thead>
<tr>
<th>District</th>
<th>Nadia</th>
<th>North 24 Parganas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boy</td>
<td>Girls</td>
<td>Co-ed.</td>
</tr>
<tr>
<td>1: (4 Schools)</td>
<td>1: (4 Schools)</td>
<td>1: (4 Schools)</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

Diagram:

```
+---------------------------+---------------------------+
<table>
<thead>
<tr>
<th>District</th>
<th>District</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nadia</td>
<td>North 24 Parganas</td>
</tr>
<tr>
<td>(4 Schools)</td>
<td>(4 Schools)</td>
</tr>
<tr>
<td>Boys (1)</td>
<td>Boys (1)</td>
</tr>
<tr>
<td>Girls (1)</td>
<td>Girls (1)</td>
</tr>
<tr>
<td>Co-ed. (2)</td>
<td>Co-ed. (2)</td>
</tr>
</tbody>
</table>
```
Table – 3.2

Showing the Sample Size

<table>
<thead>
<tr>
<th></th>
<th>Boys (179)</th>
<th></th>
<th>Girls (193)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Size</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(372)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class VIII</td>
<td>(116)</td>
<td></td>
<td>(117)</td>
</tr>
<tr>
<td>Class IX</td>
<td>(63)</td>
<td></td>
<td>(76)</td>
</tr>
</tbody>
</table>

Table – 3.3

Showing Description of the Sample

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Name of the Schools and Place</th>
<th>Type</th>
<th>District</th>
<th>Grade–VIII</th>
<th>Grade–IX</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Boys</td>
<td>Girls</td>
<td>Boys</td>
</tr>
<tr>
<td>1</td>
<td>Dhanicha High School (H. S.), Chakdaha</td>
<td>Co-ed</td>
<td>Nadia</td>
<td>15</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>Shantipur Oriental Academy, Shantipur</td>
<td>Boys</td>
<td>Nadia</td>
<td>29</td>
<td>–</td>
<td>28</td>
</tr>
<tr>
<td>3</td>
<td>Shaktinagar Girls’ High School, Krishnagar</td>
<td>Girls</td>
<td>Nadia</td>
<td>–</td>
<td>18</td>
<td>–</td>
</tr>
<tr>
<td>4</td>
<td>Belgharia High School, Belgharia</td>
<td>Boys</td>
<td>24 Pgs. (N)</td>
<td>15</td>
<td>–</td>
<td>11</td>
</tr>
<tr>
<td>6</td>
<td>Deshbandhu High School, Naihati</td>
<td>Co-ed</td>
<td>24 Pgs. (N)</td>
<td>31</td>
<td>27</td>
<td>09</td>
</tr>
<tr>
<td>7</td>
<td>Kataganj Gokulpur Adarsha Shikshaniketan, Gayeshpur</td>
<td>Co-ed</td>
<td>Nadia</td>
<td>22</td>
<td>23</td>
<td>–</td>
</tr>
<tr>
<td>8</td>
<td>Pearah Teghoria High School (H. S.), Baduria, Basirhat</td>
<td>Co-ed</td>
<td>24 Pgs. (N)</td>
<td>04</td>
<td>07</td>
<td>–</td>
</tr>
</tbody>
</table>

For selecting the sample, stratified random sampling technique was used. The process of sampling was done as follows:
Step – I: The researcher first prepared a list of Bengali medium secondary and higher secondary schools under West Bengal Board of Secondary Education for the two districts – Nadia and North 24 Parganas separately.

Step – II: From the above mentioned list, three types of schools, viz.; Boys’ school, Girls’ school and Co-educational school, were separated and thereby three lists of schools were obtained for each district.

Step – III: It was found that the number of such type of Boys’ school was 70 and the number of Girls’ school was 86 and the number of Co-educational school was 235 in Nadia district. Similarly, in the district of North 24 Parganas, the number of Boys’ school was 195 and the number of Girls’ school was 224 and the number of Co-educational school was 401. All the schools were arranged serially under the particular category where a particular school contained a particular serial number.

Step – IV: Out of total 8 schools, 4 schools were selected from each district. Again, out of 4 schools, one Boys’ school, one Girls’ school and two Co-educational schools were selected. The researcher drew at random the serial numbers of one Boy’s school, one Girls’ school and two Co-educational schools from each district by using lottery technique.

Both districts had diversified areas which included part of A-I city, several Municipalities, Industrial Organisations, Business Markets, many villages and cultivated lands. So, the inhabitants of these areas, no doubt, were very different in profession as well as in family conditions. Therefore, the students who came from these families, treated as sample, might be of different degree of components of family environment. Hence, the description of the sample given in Table 3.3 would provide a perfect representation of the population of the study.

3.6 Variables

The main objectives of the study were: to identify the creative individuals, gender difference in components of creativity, relationships between components of
creativity and different aspects of family environment. Thus the variables for this study were as follows:

A) Independent Variables:

Independent variables in this study were as follows:

i) Freedom of thought and actions enjoyed by the students in the family,
ii) Family Structure,
iii) Family Tension,
iv) Socio-economic Status of the family,
v) Gender.

B) Dependent Variables:

Dependent variables in this study were students’ performance scores, only on three components of creativity, obtained from verbal and non-verbal creativity tests.

i) Fluency (verbal fluency, non-verbal creativity).
ii) Flexibility (verbal flexibility, non-verbal flexibility).
iii) Originality (verbal originality, non-verbal originality).

3.7 Sources of Data

The required data were collected from the sample by using different tools and techniques. Near about 800 students of class VIII and class IX of 8 different types of schools of district Nadia and North 24 Parganas (4 schools from each district) had been assigned for the sample. Out of 800 students only 410 students were present in all the tests held on two conjugative days. Again out of 410, some students were irresponsible, careless or unable to follow the instructions of the tests and some concealed true information. Ultimately 372 students (179 boys and 193 girls) were as the sample of the study from where data were collected.
PART – II

3.8 Tools Used

The following tools were used in the present study:

3.8.1 Sarker’s Creativity Tests

Sarker’s Creativity Tests were developed by Sarker, A. K. (1994) and could be administered to individuals at all educational levels above six years of age. The tests consisted of several batteries of test activities – verbal and non-verbal form. Both the verbal and non-verbal tests of activities assessed the products in terms of fluency, flexibility and originality.

Sarker’s Creativity Test was a standardized test prepared by Sarker, on the scores of the students of Bengali medium schools of West Bengal. These test batteries had three forms:
1) Long Form of Creativity Test.
2) Short Form of Creativity Test.
3) Intermediate Form of Creativity Test.

The Intermediate Form of Creativity Test had been chosen by the researcher for this present study considering different relevant situations. In administration of the tests, Sarker emphasized on the matter that the subjects would be understood about how to play the game, by giving an example about the test before commencement of the test. A certain time period was allotted for the particular test items.

The brief descriptions of the tests were given below:

3.8.1.1 Sarker’s Verbal Test of Creativity

The verbal activities used as different games in the present study were as follows:

Game – 1: Unusual Uses

The unusual uses test using verbal stimuli were direct modification of Gilford’s Brick Uses Test. Here three tasks were given to the subjects to write down their unusual uses. That three tasks were ‘Tin cans’, ‘Newspaper’ and ‘Brick’. Below the
every task item, there was a space for their responses. There was 6 minutes of time period to write down the unusual uses.

**Game – 2 : Similarity Task**

There were two task items to find out the similarities between two components or products. These similarities would be exceptional from common similarities. The two task items were “water and air” and “shoe and cap”. Space was given below each task item, so that the students could response point wise. There was 5 minutes time to respond.

**Game – 3 : Consequences Tasks**

There were 2 impossible situations and the subjects were asked to find out the new, uncommon and different responses as the results of the situations in the long run within 5 minutes of time. The subjects would write down the responses in the blank spaces provided below of each of the items.

**Game – 4 : Common Problem Tasks**

This task was an adaptation of Guilford’s (1951) test designed to assess the ability to see defects, needs, deficiencies and found to be one of the tests of the factor termed “sensitivity to problems”. Two common problems raised in daily life were given in this game. The subjects were asked to write down new and uncommon different problems or difficulties as many as possible within 6 minutes of time. Space was provided below each of the tasks to write down their responses.

**Game – 5 : Product Improvement Tasks**

The Improvement tasks were adapted from Guilford’s (1952) Apparatus Test which was designed to assess ability to see any kind of defects, an aspect of sensitivity to problems. In these tasks, two products were given and the subjects were asked to think of as many improvements as they can within 8 minutes time.
3.8.1.2 Sarker’s Non-verbal Test of Creativity

There were 4 tasks selected in Non-verbal Test of Creativity for this present study. These were as follows:

Game – 1 : Circle Test

The circle task was originally designed as a non-verbal test of ideational fluency and flexibility. The directions were then modified in such a way to stress originality and elaboration. This task to stress originality and elaboration. This task consisted of 30 small circles (one-inch diameter). The subjects were asked to use the circles as the main part of the objects which they would sketch.

The objects would be variety of types and uncommon as far as possible within 12 minutes time. Fluency, Flexibility and Originality were encouraged by the instructions and test records were scored for each of these three components.

Game – 2 : Incomplete Figure Tasks

Incomplete Figures task was an adaptation of the Drawing Completion Test, developed by Barron (1958). The incomplete figures techniques had also been used in a variety of psychological tests for other purposes. An incomplete figure was set up before an individual and asked him to complete it as in the simplest and easiest way as possible. Thus to produce an original response, the subjects usually had to control his tensions and delay gratification of this impulse to closure. In this game, there were six incomplete figures in six rectangles of a page. The subjects might draw any picture or figure using each of the incomplete figure within total 8 minutes time.

Game – 3(A) : Asking Questions Task

In this game, a picture of social situation was given to the subjects. How the subjects had curiosity, interest and awareness about the social environment and how far they thought about the situation were the objectives of this test. Their responses must be in question form about the situation in the picture within 5 minutes time. The subjects were encouraged by the instructions to have fluency, flexibility and originality in their responses. The test records were scored for these three components.
Game – 3(B) : Asking Questions Task

In this game, the subjects were asked to respond in question form about the real product of daily use. Here, a watch was shown before them for one minute and they were allowed to ask questions about the whole watch, its different parts, its functions etc. within 5 minutes time. Questions as responses were scored for fluency, flexibility and originality.

Copy of the tests had been given in Appendix – B.

Scoring

The scoring procedure in the present study was the same as given in the test manual and scoring guide (1994). All the responses were scored for fluency, flexibility and originality. The fluency score was obtained by counting the number of different relevant responses. At first, the relevant responses were sorted by striking off the irrelevant responses. Then the relevant responses were categorized as per scoring guidance laid down in the scoring manual. Flexibility score was determined by counting the number of category changes. Originality was determined on the basis of statistical infrequency of responses as laid down in the scoring manual of the test. On the basis of that criterion, weightages were assigned to all the probable responses or types of responses. Thus, each response was given a value. The Originality score was determined, for that respondent, by adding up the values or weightages of all responses.

The manual strictly described that the raw scores of fluency, flexibility and originality should not be added up because each variable had a different mean and different standard deviation. Thus the raw scores for fluency, flexibility and originality had been converted into standard scores. For convenience in handling the scores and omission in the negative signs of the standard scores, the raw scores had been converted into T-scores (M =50; SD = 10). Total Fluency had been determined by adding up of fluency of verbal creativity and that of non-verbal creativity after converting each of them into T-scores. Similarly, Total Flexibility and Total Originality were calculated only for Regression Analysis in the present study.
Reliability

Although most of the usual concept of reliability were relevant to the assessment of creativity, the very nature of this ability was to create a number of problems in interpreting reliability data. Most of the theories of creative functioning emphasized the significance of emotional factors, bodily stages, group atmosphere and family environment and the like. There were some like Gordon (1961) who insisted that “in the creative process emotional component is more important than the intellectual, the irrational is more important than the rational”. Another difficulty in this context was that the life experiences of an individual might help or hinder creative functioning. Environment, emotional, physical, motivational and mental health factors also might affect creative development and functioning which made lower the test-retest reliability. In a number of test-retest reliability studies, as reported by Torrance (1966), reliability co-efficient were generally found higher for fluency and flexibility than for originality. However, these results were not confirmed in another study (Dalbec, 1966) who obtained test-retest reliability co-efficient of 0.59 for fluency, 0.35 for flexibility, and 0.73 for originality over a four year period.

In Sarker’s Creativity Test, for different test items of both verbal creativity and non-verbal creativity, coefficients of reliability for test-retest were ranging from 0.73 to 0.92. Again, the co-efficient of reliability for different test items of both verbal and non-verbal creativity by split-half method were ranging from 0.68 to 0.88.

Validity

A person can behave creatively in an almost infinite number of ways. Therefore, according to Torrance, it would be ridiculous even to try to develop a comprehensive battery of tests of creative thinking that would sample any universe of creative thinking abilities. Torrance did not believe that any one could specify the number and range of test tasks necessary to give a complete assessment of a person’s potentialities for creative behaviour.

Sarker’s Creativity Test was reported to have high construct validity. This test tasks were standardized over the Bengalee school going students. Also these tests were used in several Ph. D. research works (Sarkar, P.,1994; Biswas, P. C., 1988).
3.8.2 Sarker’s Freedom Test

Sarker (1986) developed a Freedom Test for school going children in Bengali, and it was standardized on the students of Bengali medium schools of West Bengal. Freedom of thought and actions in the family and in the school might foster the creative potential in the children. The test items concerned with the freedom of thought and work in scientific experiments, hobby, personal views or in daily life style. There were 29 test items out of which 25 items were about thought and actions in the family and only 4 items were about that in school. There were three options – ‘True’; ‘?’; ‘False’ put against each of the statements. The correct response was done by underline one out of the three options according to the student’s view.

Scoring:

According to freedom of thought and actions, the correct response against each of the statements was given in test manual. The percentage of freedom was calculated as follows:

\[
\text{The Freedom Index} = \frac{\sum F}{N} \times 100
\]

where \( F \) = correct response for Freedom and \( N \) = the total number of test items. In the present study the investigator calculated Freedom score by adding up Fs, the correct responses for freedom, as the score would describe the respondent in the relative placement.

Reliability

Reliability of the test was reported to be very satisfactory. The co-efficient of reliability for test-retest was 0.78.

Validity

The validity index of this test was 0.63.

3.8.3 Sarker’s Socio-economic Status Test

Standardized Tests of Socio-economic Status provide numerical description of the family and home in the context of social hierarchy. Chapin’s (1988) scale had
been widely used by the social researchers for assessing Socio-economic Status on the basis of various criteria of home and family, such as, income, occupation, the number and condition of household or living room articles, membership in social and cultural organizations extent of wealth possessed by the family.

In India, Kuppuswamy (1962) devised a Socio-economic Status scale (for urban area) which included three categories of items : education, occupation and income. Weightages were assigned to seven items for each category. This scale was reported to be highly reliable and valid and had been widely used in the Hindi belt of India.

Pareek and Trivedi (1964) developed a Socio-economic Status Scale (for rural area) in which the criteria of Socio-economic Status were : occupation, education, social participation of the head of the family, caste, land owned, house type, farm powers, material possessions and general nature of the family. This scale had been widely used in Hindi belt of India, where it was standardized.

Sarker (1998) developed a single Socio-economic Status scale for the urban, industrial and rural children in Bengali and it was standardized on the high school children of West Bengal. This scale was latest revised in the year 2007 on the high school children of Bengali medium school of West Bengal. It included the following major items : education, profession, income of parents, extent of land owned, house (own or rented), condition of house, subscription of newspaper and periodicals, musical instruments and possession of household materials (their quality and numbers). The chief contention of Sarker was that, information given by children regarding parental income, educational qualification and profession, land owned by the family can hardly be reliable but children could easily supply reliable information regarding articles possessed by the family; hence, he paid more emphasis on the information of children regarding possession of articles in assessing Socio-economic Status.

**Scoring**

The items of the scale was scored by assigning weights according to the directions written by Sarker in the manual.
Reliability

Test-retest reliability of the scale was 0.95 which was significant beyond 0.01 level. Split-Half reliability of the scale was 0.87.

Validity

Co-efficient of correlation between the scores for the scale and data obtained through actual home visit was 0.86 which was reported to be significant at 0.01 level.

Again, correlation between the scores of Sarker’s scale and that of Kuppuswamy and Pareek and Trivedi on the same sample, were very high (above 0.9 in each case).

Norms

The following criteria were used to classify different strata – High, Middle and Low:

High Socio-economic Status Group → Top 27% of the scores,
Middle Socio-economic Status Group → Middle 46% of the scores,
Low Socio-economic Status Group → Lower 27% of the scores.

The Sarker’s Socio-economic Status scale was used in this study for the following reasons:

i) It was standardized over the same type of sample as was used for this study.
ii) It was simple and easy to score.
iii) Language used in the tool was Bengali.
iv) Its norms had recently been established.
v) Reliability and validity of this scale was found satisfactory.
vi) This single tool could be utilized for the rural, industrial and urban areas.

3.8.4 Sarker’s Family Questionnaires – I and II (For Family Structure)

Sarker’s Family Questionnaires – I and II were used to assess Family Structure. These Family Questionnaires were adapted from Herbst Day-at-Home developed by Herbst (1952). This tool included 33 questions about relatively trivial household activities in which the child was asked to report “Who does the common
household activity?” and “Who decides about it?” between the parents. Herbst selected these items with respect to four regions, such as, household duties, child care and control, social activities and economic activities. He also considered a time sequence for an ordinary work day. In fact, it was believed by Herbst that the child was a better informant about such household affairs than the parents, because, parents might tend to report a picture of greater mutuality and co-operation than that actually existed.

Nijhawan (1972), in her Hindi and Punjab adaptation of the above tool, two items (Numbers 11 and 12) were eliminated as these items were not related to Indian culture and some other items were slightly modified.

Sarker’s Family Questionnaires were prepared by Sarker (1997) on the basis of principles followed by Herbst (1952) and items selected by Nijhawan (1972) for Bengalee children and adolescents. Unlike the original tool, it consisted of 38 questions in each questionnaire. These items represented the common activities of a Bengalee home. This tool had the five fold division of family structure. These were Father Dominant, Mother Dominant, Autonomic, Syncratic Co-operative and Syncratic Division of Functions.

For each area of activity within the family there were three possibilities with regard to acting and deciding about various household activities, namely;

**Activity:**

\[ F_a \Rightarrow \text{Father does the activity by himself.} \]
\[ M_a \Rightarrow \text{Mother does the activity by herself.} \]
\[ B_a \Rightarrow \text{They both do it together.} \]

**Decision:**

\[ F_d \Rightarrow \text{Father decides it by himself.} \]
\[ M_d \Rightarrow \text{Mother decides it by herself.} \]
\[ B_d \Rightarrow \text{They both do it together.} \]
Scoring:

Percentage of family pattern was designated as follows:

1) Father Dominance (FD):

\[ \text{Percentage of items on which } M_a F_d + B_a F_d \]

2) Mother Dominance (MD):

\[ \text{Percentage of items on which } F_a M_d + B_a M_d \]

3) Autonomic (At):

\[ \text{Percentage of items on which } F_a F_d + M_a M_d \]

4) Syncratic Co-operative (Syn-co):

\[ \text{Percentage of items on which } B_a B_d \]

5) Syncratic Division of Functions (Syn-DF):

\[ \text{Percentage of items on which } F_a B_d + M_a B_d \]

The pattern on which the greatest percentage fell for a certain family was considered to be its family structure. For this study, the highest number of items contained in the category was considered to be its family structure.

Reliability

Reliability of the instrument was reported to be very satisfactory. Co-efficient of correlation (r) for test-retest (6 weeks interval) and split-half (odd-even) were 0.81 and 0.73 respectively.

Validity

The tool was reported to have high construct validity.

This tool was very easy to administer and was standardized over the Bengalee High School Children. The reliability and validity of this tool were highly satisfactory. For these reasons, the investigator utilized this instrument for this study.
3.8.5 Sarker’s Family Questionnaire – III (For Family Tension)

Sarker’s Family Questionnaire – III was used to assess Family Tension. Family Tension was measured by the extent to which disagreement existed between the parents of the child about the various family activities. This questionnaire was prepared by Sarker (1997) on the basis of the questionnaire developed by Nijhawan (1972) for Bengalee children and adolescents. This questionnaire consisted of 48 questions to determine family tension. These items represented the agreement or disagreements between father and mother about common activities of Bengalee home. The following classification was used:

\[
\begin{align*}
T & \Rightarrow \text{Parents disagree sometimes or often.} \\
T_0 & \Rightarrow \text{Parents never disagree.}
\end{align*}
\]

**Scoring:** The percentage of areas in which tension occurred was calculated as follows:

\[
\text{The Tension Index} = \frac{\sum T}{N} \times 100
\]

where \(N\) was the total number of items sampled.

In the present study the investigator calculated Family Tension score by adding up Ts, as the score would described the respondent in the relative placement.

**PART – III**

3.9 Procedure

For the purpose of collecting data, rapport was established with the students by explaining them the objectives of the study in brief. The data were collected by administering the tests in normal classroom situation. The total time taken for collection of data was 20 weeks.
The sequence of tests administration in each of the 8 schools was as follows:

<table>
<thead>
<tr>
<th>Day</th>
<th>Class</th>
<th>Test Administered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day – I (First Half)</td>
<td>VIII</td>
<td>Sarker’s Creativity Tests (Verbal and Non-verbal)</td>
</tr>
<tr>
<td>Day – I (Second Half)</td>
<td>IX</td>
<td>Sarker’s Freedom Test, Sarker’s Socio-economic Status Test, Sarker’s Family Questionnaire – I and II (for Family Structure), Family Questionnaire–III (for Family Tension).</td>
</tr>
<tr>
<td>Day – II (First Half)</td>
<td>IX</td>
<td>Sarker’s Creativity Tests (Verbal and Non-verbal)</td>
</tr>
<tr>
<td>Day – II (Second Half)</td>
<td>VIII</td>
<td>Sarker’s Freedom Test, Sarker’s Socio-economic Status Test, Sarker’s Family Questionnaire – I and II (for Family Structure), Family Questionnaire–III (for Family Tension).</td>
</tr>
</tbody>
</table>

While administering the tests selected in this study, the following instructions were given to the students:

3.9.1 Administration of Sarker’s Creativity Test

Before passing out the booklets, the following brief orientation instructions were given to the students in the classroom setting, which would make a particular group to be honest, arouse interest and motivate for performance.

“I believe you will have a lot of fun doing the activities we have planned for. This test will give you a chance to see how you are at thinking up new ideas and solving problems. The test will call for all imagination and thinking ability you have. So, I hope that you will put on your best thinking and you will enjoy yourself”.

At this point the booklets were given to the students and they were asked for giving the identification information on the front page. Moreover, the following information was given to the students in Bengali in the classroom:

“All the activities are arranged here as different games of different types in the two booklets. Out of two booklets, one (Verbal Form) is already given to you. It contains 5 games and each of the games has its particular rules and regulations to play it. The other booklet (Non-verbal Form) contains 3 games to play. These games
will give you a chance to use your imagination in thinking up ideas and putting them in the form of words and pictures. There are no right or wrong answers in the games. Try to think of as many ideas as possible which are interesting and unusual within particular time period. Work as fast as you can. Write the answers in simple and concise. Don’t worry about the bad hand writing and spelling mistakes. Figures need not to be much clear and fair. If you run out of ideas before time is called, wait until next instructions are given. If there is any difficulty after the start, raise your hand, I will help you”.

3.9.1.1 Creativity Test (Verbal Form)

Game – 1 : Unusual Uses Tasks

Instruction :

“In this game, there are 3 different materials in your sheet. Your duty is to write down as many as possible different unusual uses of each product at the blank space below within 6 minutes time. Uses should be of different types. Remember that the products may be small or big in size or any other form as you like”.

An example was given with a piece of cloth. The unusual uses of a cloth were discussed among the subjects and the investigator to make understand about their activities.

“You should write down that uses which are really cheerful, cleverest, uncommon, unthinkable to your peers and different in nature. As the time is very short, only 6 minutes, your responses should be very simple and concise and you should not think about the spelling mistake in the responses”.

A stop watch was used to measure the time duration. After the due time, the page was turned over rapidly.

Game – 2 : Similarity Tasks

Instruction :

“In this game, you have a page containing the names of two pairs of materials. You should have to find out the new and uncommon different similarities between the two materials as many as possible within 5 minutes time”.
An example was given with the pair – “Train and Tractor”. The subjects tried to find out the similarities with the help of the investigator. Investigator also mentioned some cheerful, cleverest and uncommon similarities.

“You should try to find out that similarities which are unique and very new and what your peers can not think yet. Your responses should be very simple and concise and you should not think about the spelling mistake in the responses”.

A stop watch was used to measure the time duration. At last the page was turned over shortly after the time over.

**Game – 3 : Consequences Tasks**

**Instruction :**

“In this game, you have the page containing 2 impossible situations. You should have to find out the new, uncommon and different responses as the results in the long run of that impossible situation within 5 minutes of time”.

An example was given to the students with the impossible situation – “What would happen, if all the houses were floating in the sky’. The students tried to find out that responses with the help of the investigator. Investigator also added some uncommon and new responses about that impossible situation.

“I think you have understood about the game. You should write down that results which are really new and uncommon and what your peers can not think yet. Mind that your responses should be of different types. As the time is short, only 5 minutes, your responses should be simple and concise. Do not think about the spelling mistake in your responses”.

A stop watch was used to measure the time duration. When the allotted time was over, the page was turned out rapidly.

**Game – 4 : Common Problem Tasks**

**Introduction :**

“In this game, you have the page containing two common problems raised in your daily life. You should have written down new and uncommon different problems or difficulties as many as possible within 6 minutes of time”.
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An example was given to the student with – “What problems raise in taking a bath”. Subjects were tried to find out the problems in connection with the situation.

“You should write down that unique and uncommon problems, what your peers can not think yet. You should mention as many problems as you think that might arise in connection with these situations. Do not think about the spelling mistake in your responses”.

Allotted time period was measured with the help of a stop watch. When the time was over, the page was turned over rapidly.

Game – 5 : Product Improvement Tasks

Introduction :

“In this game, you have the page containing the names of two common products. You should suggest as many ways as you can to improve these products within 8 minutes of time”.

An example was given to the subjects with “the clay made doll”. Subjects were tried to give some suggestions to improve the doll with the help of the investigator.

“You should mention that suggestions which make the product more interesting, attractive, workable and useable. Do not worry about whether or not it is possible to make this change. You should write down that new and uncommon changes what your peers can not think yet. Do not think about the spelling mistake in your responses”.

Allotted time period was measured with the help of a stop watch. When the allotted time was over, the sheet was collected rapidly.

3.9.1.2 Creativity Test (Non-verbal Form)

The second booklets were distributed among the students. After giving their information on the first page, the subjects were instructed to turn over.

Game – 1 : Circle Task

“In this game, you have the page which contains 30 circles of 1 inch diameter each, your duty is to draw various pictures or objects as many as possible by adding
lines within 12 minutes time. The circles should be the main part of whatever you make. You can place marks in the circles, outside the circles or both sides of the circles – Whenever you need to complete the picture. Try to think of things that no one else will think and make as many different pictures or objects as you can and put as many ideas as you can think. Add name or title below each of the objects”.

As example, the investigator draw 9 objects in the Black Board by using triangles given early. After due time, the page was turned over soon.

**Game – 2 : Incomplete Figure Task**

**Introduction :**

“In this page, there are 6 rectangles which contain 6 incomplete figures, one in each rectangle. You should sketch some interesting objects or pictures by adding lines to the incomplete figures on this page within 8 minutes time. Try to think of some picture or object that no one else will think in your class. Do not stop with your first idea for completing the figure; keep building onto it. Make up an interesting title or name for each of the figure at the bottom of the block”.

After due time, the page was turned over soon.

**Game – 3(A) : Asking Questions Task**

**Instruction :**

“The main objective of this game is to know how far you are interested and curious about the social environment where you live. You have already got the page containing a picture of a social situation at the top of the page. Try to write down as many as possible questions which arise in your mind linked with the situation within 5 minutes time. These questions may be related with the fact, part of the picture, whole picture, the past and future happens. Avoid the questions whose answers may be obtained by seeing the picture. The questions must be related with the picture and must express your interest and curiosity. But the questions should be very different with respect to subject-matter, meaning and sequence. Make an interesting name or title of the picture at the bottom of the block”.
Allotted time is measured by a stop watch and after completion of time, the paper was turned over rapidly.

**Game – 3(B) : Asking Questions Task**

**Instruction :**

“This game is as like as the earlier one. You should make questions about a product of daily use as many possible as you can within 5 minutes time. A wrist watch will be shown before you for a one minute. You should write down the related questions about part of the watch, whole watch, its functions, its structure, its manufacturing etc. as many possible as you can. Write down that questions which no one else can think of. Mind it, you will write down that questions whose answers are not available by seeing the watch. Besides these, the questions must be simple, precise and different in nature. Mention an interesting name of the watch.

After completion the allotted time, the booklets were collected from the students rapidly.

**3.9.2 Administration of Sarker’s Freedom Test**

Freedom Test was the first test for administration on the second day of data collection. After distributing the Test sheets among the students, they were instructed to write down their identifying information in the space given at the top of the sheet.

**Instruction :**

“There are 29 test items in your booklet which has already given to you. There are three options – ‘True’; ‘?’; ‘False’ put against each of the statements. If you think the statement is true for you, then underline ‘True’ and is false for you, then underline ‘False’. If the statement is not true and not false or do not understand the statement, then underline the question mark (?). You have no time limit to respond. Your responses will be highly concealed and nobody will know it. Moreover, it will be used only for this study”.

After completion, all the sheets were collected in the class.
3.9.3 Administration of Sarker’s Socio-economic Status Test

Socio-economic Status Test was the second test for administration in the second conjugative day of data collection. The researcher tried to make rapport with the students by describing the objectives of the tests, ensuring about the concealment of data and explaining the importance of this work.

Instruction:

“You have already got a questionnaire sheet titled “Socio-economic Status Test”. You should respond what actually exists in your family. You should write down your parents’ qualification, occupation and monthly income at the spaces given therein. You should also write down, so far correct, own land property, different rooms in house, newspaper etc. and on the next page, give a tick (✓) mark which good is existed in your family and give a cross (×) mark which does not exist in your family. Also, mention the quantity of goods within bracket. You have no fixed time limit to respond. Remember that your responses will be highly concealed and nobody will know it. Moreover, it will be used only for this study.”

3.9.4 Administration of Sarker’s Family Questionnaires–I and II (For Family Structure)

Instruction:

“You have a question booklet title ‘Family Questionnaire” and a Answer Sheet. Write down your name, name of your school, age, class, section, roll number and date on the top of your answer sheet. But do not write anything in question booklet. Now, turn over the answer sheet, you will get the space for writing your answers against the question serial number. These questions are about your family and family conditions. There is no ‘right’ or ‘wrong’ answer of the question. You should write the correct symbol as answer which is true in your family. Considering your family condition if the relevant answer is Father then write “F” as answer in the space provided and write “M” for Mother, and write “B” for both Father and Mother together and write “O” for other (if not Father or Mother). Do not worry, your responses will be strictly concealed and will be used only for this study”.

After completion the answers of the questionnaires – I and II, the subjects were instructed to turn over the page.

3.9.5 Administration of Sarker’s Family Questionnaire–III (For Family Tension)

Instruction:

“Now you have the Family Questionnaire–III and its answer sheet. Here, the test items are almost similar to the previous one. But emphasis is given on the opinions or views of your parents about the matters and on the situations created thereafter. There are three options – (a) often, (b) sometimes, (c) never, given against each of the questions of the questionnaire. Considering your family condition, you should tick (✓) the correct alternative. Do not worry about the concealment of your responses. Nobody will know your responses and it will be used only for this study”.

After completion of the answers, the answer sheets and the question booklets were collected in the class.

3.10 Data Collection

The tools and techniques, mentioned early, had been used for the collection of data. All the tools had been administered personally by the investigator as it was thought appropriate on account of the complexity of the tests, its instructions and to maintain uniformity in the testing procedure.

All the tools were administered to all the students of that classroom to avoid unexpected situations in the hall. The tools were administered in two conjugative days in the same classroom. Some students were absent either of the two days, i.e., they were not present in all the tests. Moreover, some were irresponsible, careless or unable to follow the instructions of administration of the tests and some concealed true information. Ultimately 372 students out of 800 students of class VIII and class IX were as the sample of the study. Scoring of the responses of the total sample had been done in accordance with the scoring procedures mentioned in the test manuals. These scores were treated as the raw data for the present study, which had been later converted into T-scores only for Regression Analysis. The data thus obtained had been systematically tabulated with their code for analysis and interpretation.
3.11 Statistical Method

The collected data from the sample were subjected to different statistical techniques. All the statistics used in the study can be divided into four major parts as follows:
A) Descriptive Statistics
B) Inferential Statistics
C) Correlational Statistics, and
D) Multiple Regression Analysis

A) Descriptive Statistics

In order to find out the nature of sampling distribution, descriptive statistics were carried out for each variable. For this purpose, the statistics such as Range, Minimum, Maximum, Mean, S. D., Skewness, Kurtosis were calculated with the help of Computer Software SPSS–12.0. Moreover, pie-graphs were plotted in somewhere to describe the groups.

B) Inferential Statistics

One-way ANOVA design was adopted to find out whether there was any significant mean difference between boys and girls or high and low groups under consideration.

After ensuring about the significance of the mean difference between two groups, ‘t’-test had been applied to know the difference in two means, the higher group in details.

C) Correlational Statistics

Testing the relationships among the variables of the present study, multiple correlation method was applied. For this purpose, Pearson’s Product Moment method was used. The correlation index had been calculated among independent variables – Freedom, Socio-economic Status, Family Tension and dependent variables – Fluency, Flexibility, Originality of both verbal and non-verbal creativity. Apart from these, partial correlations were also calculated for each independent variable to assess the
impact of the individual independent variable on the dependent variables (components of creativity – Fluency, Flexibility and Originality).

**D) Multiple Regression Analysis**

Multiple Regression model was used in the present study to predict the impact of three independent variables, i.e.; Freedom, Socio-economic Status, Family Tension on the dependent variables. The model was developed separately for three components of creativity (both verbal and non-verbal together) – Total Fluency, Total Flexibility and Total Originality. These were symbolized as $\hat{Y}$ and Freedom, Socio-economic Status and Family Tension were symbolized as $X_1, X_2, X_3$ respectively. In the present study the used Multiple Regression Equation was as follows:

$$\hat{Y} = a + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3$$

where ‘a’ was constant and $\beta_1, \beta_2, \beta_3$ were the relative weights. Beta weight ($\beta$-weight) was calculated to determine the relative importance of the independent variable. In other words, $\beta$ weight would tell the amount of change in the dependent variable as a result of a standardized change in one of the independent variable controlling for all other independent variables using a common unit of measurement.

Thus, in this study, components of creativity might be predicted from a linear combination of Freedom (of thought and action enjoyed by the students in the family), Socio-economic Status, Family Tension. The $\beta$-value analysis had been done for each of the Multiple Regression Equations.

**3.12 Level of Significance**

All the hypotheses in this study were tested on the basis of the results obtained through the analysis of the data using the statistical methods mentioned early. In comparison between the two groups on a particular variable being investigated or relationships among the variables, the hypotheses were tested at 0.01 and 0.05 level of significance. As the data analysis was done by using computer software SPSS -12.0, the ‘F’-values, ‘t’-values or ‘r’ etc. were found with their respective level of significance directly. The researcher had interpreted the results of analysis by considering 0.01 and 0.05 level of significance only.